

## A reinstatement and a new combination in *Leucopogon* (Ericaceae: Styphelioideae: Styphelieae)

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### Abstract

Hislop, M. A reinstatement and a new combination in *Leucopogon* (Ericaceae: Styphelioideae: Styphelieae). *Nuytsia* 21(4): 163–176 (2011). The group of species synonymised by Bentham (1868) under *Leucopogon revolutus* R.Br. are re-examined and found to be heterogeneous. As a result *L. rubricaulis* R.Br. is reinstated. Two morphotypes identified within *L. obovatus* (Labill.) R.Br. (erroneously treated by Bentham as *L. revolutus*) are described as subspecies and the combination *L. obovatus* (Labill.) R.Br. subsp. *revolutus* (R.Br.) Hislop is here published. Descriptions and illustrations are provided for the three taxa treated and their distributions are mapped. Lectotypes are designated for *L. capitellatus* DC. var. *sparsiflorus* Sond., *L. revolutus*, *L. rubricaulis* and *L. villosus* R.Br.

### Introduction

There has been long-standing confusion surrounding the taxonomy of several similar-looking *Leucopogon* R.Br. taxa from the south coast of Western Australia, which can be broadly characterized by their relatively long, narrow leaves with distinctly recurved or revolute margins. *Styphelia obovata* Labill. was the first name published (Labillardière 1805) in the group, and that species is also notable in being the first endemic Western Australian epacrid to be described. Five years later Robert Brown (1810) transferred it to his new genus *Leucopogon*. In the same publication Brown described another three species with similar foliar morphologies, *L. revolutus* R.Br., *L. rubricaulis* R.Br. and *L. villosus* R.Br., based on collections he made at King George Sound [Albany] and from two localities east of where the town of Esperance is now sited. Bentham (1837) added *L. angustatus* Benth. to the group, which was later followed by the infraspecific taxon, *L. angustatus* var. *hirsutus* Sond. (Sonder 1845). In his treatment of *Leucopogon* in *Flora Australiensis* however, Bentham (1868) not only changed his mind about the separate status of *L. angustatus*, but decided that the ‘group’ as a whole was better treated as a single variable species. While apparently recognising that *L. obovatus* had priority, he preferred to apply the name *L. revolutus*, which he thought more appropriate, and treated all of the others as synonyms. Blackall and Grieve (1981) continued to recognise only one species but, realizing that Bentham had erred in using *L. revolutus*, they returned to *L. obovatus*. Since the late 1990s both names have been included on the *Census of Western Australian Plants*, although in the absence of any published means of distinguishing between the two, they have been applied more or less arbitrarily.

The current paper revisits the taxonomy of this problematic group in the light of a much larger specimen base than was available to earlier workers, and after reference to the relevant type specimens.

## Methods

This study was based on an examination of dried specimens housed at PERTH. The details of the methods used to measure plant parts and make other morphological observations are the same as those described previously (Hislop 2009a), except in relation to the inflorescence character of *Leucopogon rubricaulis*, which is of the type described for the *L. gracilis* group (Hislop 2009b). The basal point of the terminal inflorescence for that species is therefore taken to be the lowest axil from which a single flower arises (below which multi-flowered axillary inflorescences are usually present), and for axillary inflorescences, the point of attachment to the main axis. The fertile bract measurements are taken from the upper three inflorescence nodes only.

The distribution maps were compiled using DIVA-GIS Version 5.2.0.2 and based on PERTH specimen data.

## Taxonomy

**Leucopogon obovatus** (Labill.) R.Br., *Prodr. Fl. Nov. Holl.* 542 (1810). *Styphelia obovata* Labill. *Nov. Holl. Pl.* 1: 48 (1805). *Type*: 'in terrâ Van-Leuwin' [near Esperance, Western Australia], 13–18 December 1792, J.J.H. Labillardière s.n. (*holo*: FI-W118462, image seen).

Erect, robust *shrubs* to c. 2.5 m high and 2 m wide, usually multi-stemmed at the base and at least sometimes with a fire-tolerant rootstock. Young *branchlets* with a moderately dense to dense indumentum, either monomorphic with short hairs to c. 0.1 mm or dimorphic with the layer of short hairs overtopped by a longer layer, 0.3–1.0 mm long, the short hairs patent,  $\pm$  straight or slightly curved, the longer ones variously orientated, straight to distinctly curved. *Leaves* spirally arranged, mostly variously antrorse to  $\pm$  patent, occasionally shallowly retrorse, shape very variable depending to a significant extent on the degree of curvature, from narrowly ovate or narrowly triangular to linear, oblong, elliptic or narrowly elliptic, to obovate, narrowly obovate or narrowly obtriangular, 6–23 mm long, 0.6–4.5 mm wide; apex obtuse to acute with a  $\pm$  recurved callus point; base cuneate to rounded; petiole moderately well-defined, greenish-yellow to pale brown, 0.2–0.6 mm long, usually hairy at least in part, less often glabrous; lamina 0.15–0.25 mm thick, curvature variable, adaxial surface convex with the margins varying from slightly recurved with the abaxial surface visible throughout to revolute and the abaxial surface completely concealed, longitudinal axis  $\pm$  straight; surfaces discolourous; adaxial surface shiny with a moderately dense to dense indumentum of short, tubercle-based, antrorse hairs, these often abraded on older leaves, the surface remaining verrucose, the venation usually quite distinct with 3–5 sunken veins evident, less often indistinct or barely evident; abaxial surface paler, usually hairy with either a short monomorphic indumentum or the indumentum variable and including some conspicuous, long hairs, sometimes glabrous, with 5–7 flat or slightly raised primary veins, the midrib usually somewhat more prominent than the others; margins either completely glabrous or minutely ciliolate with coarse, antrorse hairs to c. 0.05 mm long. *Inflorescences* erect, terminal and upper-axillary, usually aggregated into dense conflorescences; axis 3–28 mm long with 3–15 flowers, terminating in a bud-like rudiment or occasionally an attenuate point; axis indumentum of dense hairs 0.04–0.10 mm long; flowers erect and sessile. *Fertile bracts* ovate or broadly ovate, 0.5–1.3 mm long, 0.6–1.2 mm wide, obtuse or subacute. *Bracteoles* ovate, 1.0–2.1 mm long, 0.8–1.5 mm wide, obtuse to subacute,

keeled; abaxial surface with a sparse or moderately dense indumentum of short, often retrorse hairs, these sometimes confined to the keel, becoming scarios towards the margins; adaxial surface shortly hairy at least in the upper half; margins ciliolate. *Sepals* ovate or broadly ovate, 1.7–3.0 mm long, 1.1–1.8 mm wide, obtuse or occasionally subacute; abaxial surface usually hairy with a sparse to dense indumentum of short hairs, occasionally  $\pm$  glabrous, the central portion pale greenish or straw-coloured, sometimes with reddish tinges towards the apex, becoming scarios towards the margins, the venation obscure; adaxial surface shortly hairy at least in the upper half; margins ciliate with hairs to *c.* 0.2 mm long. *Corolla tube* white, campanulate, or broadly so, shorter than the sepals, 1.0–2.0 mm long, 1.2–2.2 mm wide, glabrous externally and internally. *Corolla lobes* white, much longer than the tube (ratio = 1.4–2.5:1), widely spreading from the base and recurved, 2.2–3.5 mm long, 0.7–1.4 mm wide at base, glabrous externally, densely bearded internally; indumentum white, 0.5–1.0 mm long near apex; glabrous tip 0.2–0.3 mm long. *Anthers* partially exerted (by *c.* 7/8 of their length) to fully exerted from the tube, 1.2–2.2 mm long, recurved towards the apex; sterile tips white, usually fairly conspicuous, 0.3–0.6 mm long. *Filaments* terete, 0.7–1.4 mm long, attached 1/2–2/3 above anther base, adnate to tube just below sinus. *Ovary* ellipsoid, globose or depressed-globose, 0.5–0.8 mm long, 0.5–1.0 mm wide, glabrous, (4)5-locular. *Style* 0.3–0.8 mm long, either well-differentiated from the ovary apex, or poorly so and tapering  $\pm$  evenly from apex to stigma, included within the corolla tube; *stigma*  $\pm$  expanded and obscurely lobed; *nectary* annular, 0.25–0.45 mm long, entire or shallowly lobed, glabrous. *Fruit* broadly obovoid, globose to depressed-globose, 1.9–2.3 mm long, 1.9–2.6 mm wide, glabrous, with smoothly rounded shoulders, longer than the calyx, mesocarp well-developed, manifesting as an irregular, raised reticulum on dried specimens; style persistent.

*Notes.* *Leucopogon obovatus* is a robust, floriferous plant with a distribution of at least 900 km along the southern coast of Western Australia. It is among the State's most frequently collected epacrids, and one which exhibits considerable variation. An examination of the large holding of this taxon (*c.* 400 specimens) at PERTH, indicates that two geographically-based morphotypes are present but with intermediates where their ranges overlap. The main differences indicative of this divergence are vegetative with some support from a correlating floral character. Intraspecific rank is chosen here as the best reflection of the nature and geographical distribution of these differences and the fact that a significant level of intergradation occurs in the relatively small area where the two are sympatric.

### Key to subspecies of *Leucopogon obovatus*

1. Branchlet indumentum monomorphic, with short hairs to *c.* 0.1 mm long, but usually less; leaf shape, when recurved margins are flattened, obovate, narrowly obovate, elliptic or narrowly elliptic, the widest point at or above the middle; leaf abaxial surface usually with short hairs only, less often glabrous; style 0.5–0.8 mm long (near-coastal areas between Denmark and Israelite Bay)..... subsp. **obovatus**
- 1: Branchlet indumentum dimorphic, with a layer of short hairs overtopped by a distinctly longer layer, the latter 0.3–1.0 mm long; leaf shape, when recurved margins are flattened, narrowly ovate or narrowly elliptic (usually very narrowly so), the widest point at or below the middle; leaf abaxial surface usually with a mixture of long and short hairs, occasionally with short hairs only or glabrous; style 0.3–0.5 mm long (Margaret River area to Albany and inland as far as the Stirling Range) ..... subsp. **revolutus**

### a. *Leucopogon obovatus* (Labill.) R.Br. subsp. *obovatus*

Young *branchlets* with a monomorphic indumentum of short hairs to *c.* 0.1 mm long. *Leaves* in natural posture linear, oblong, obovate, narrowly obovate or narrowly obtriangular, when recurved margins are flattened, obovate, narrowly obovate, elliptic or narrowly elliptic; abaxial surface with short hairs only, or sometimes glabrous. *Style* 0.5–0.8 mm long, always well-differentiated from the ovary apex. (Figures 1, 4B)

*Selected specimens examined.* WESTERN AUSTRALIA: Michaelmas Island, King George Sound, Albany, Sep. 1975, *I. Abbott* 47 (PERTH); Point Charles, Fitzgerald River Reserve [National Park], 5 Aug. 1970, *M.I.H. Brooker* 2738 (NSW, PERTH); Cape Le Grande National Park. Between Rossiter Bay carpark and the Bird Sanctuary, 24 Sep. 1985, *M. Carter* 142 (NSW, PERTH); near campsite, Bald Island, 16 Oct. 2003, *J.A. Cochrane & S. Comer* 28 (PERTH); Lort River, *c.* 200 m downstream of South Coast Highway, 16 Nov. 1993, *B.J. Conn* 4002 & *A.N.L. Doust* (MEL, NSW, PERTH); carpark at lookout, Tagon Bay, Cape Arid National Park, 7 Oct. 2003, *D.M. Crayn* 672, *K.A. Kron & A.J. Perkins* (NSW, PERTH, WFU); Hillman Street, Spencer Park [Albany], 14 Mar. 1989, *E.J. Croxford* 5414 (PERTH); Granite quarry, 2 km W of Marra Bridge, Hassell Highway, E of Albany, 23 Sep. 1987, *E.J. Croxford* 5937 (PERTH); environs of camping area, Waychinicup National Park, close to mouth of Waychinicup River, 26 Aug. 2006, *M. Hislop* 3636 (CANB, PERTH); Frenchman Bay, Albany, 1 km SE of Albany, 26 Oct. 1985, *N. Hoyle* 1341 (CANB, PERTH); Middle Island, Recherche Archipelago, 9 May 1991, *G.J. Keighery* 12369 (CANB, PERTH); Oldfield River on S side, 13 km WSW of Munglinup, *c.* 100 m W of crossing at intersection of Oldfield River and Coxall Rd, 28 Oct. 1998, *M.N. Lyons & S.D. Lyons* 3578 (PERTH); Millers Point, Beaufort Inlet, 18 Oct. 1964, *K.R. Newbey* 1520 (PERTH); Mylies Beach campsite area, Fitzgerald River National Park, 14 July 1982, *J.M. Powell* 1800 (CANB, K, L, MEL, NSW, PERTH); near Little Tagon Bay, Cape Arid National Park, 17 July 1982, *J.M. Powell* 1842 (CANB, K, L, MEL, NSW, PERTH); Stokes Inlet National Park, 20 July 1982, *J.M. Powell* 1883 (CANB, HO, K, L, MEL, NSW, PERTH); coast immediately W of West Cape Howe [W of Denmark], 26 July 1982, *J.M. Powell* 1975 (CANB, K, NSW, PERTH); on Condingup Hill *c.* 69 km E of Esperance, 1 Oct. 1970, *R.A. Saffrey* 1272 (PERTH); end of Rabbit Proof Fence, Starvation Bay, 75 km SE of Ravensthorpe, S of Springdale Rd, 19 Aug. 2001, *A. Williams* 305 (PERTH); Bremer Bay, 1 Oct. 1966, *P.G. Wilson* 4300 (CANB, NSW, PERTH).

*Distribution and habitat.* Widely distributed in near coastal localities between West Cape Howe and Israelite Bay (Figure 2), in the Esperance Plains and Jarrah Forest IBRA bioregions (Department of the Environment, Water, Heritage and the Arts 2008). Grows mostly on sand or sandy loam soils in heath or low woodland. It is frequently a dominant taxon on coastal dunes but also occurs over granite, limestone or quartzite and occasionally on subsaline flats.

*Phenology.* Flowers and/or fruit are present during much of the year, but with a flowering peak between July and October.

*Conservation status.* A widespread and common taxon.

*Notes.* The subspecies retain their differences across most of the wide range of *L. obovatus*. However in the Albany–Denmark area where their distributions overlap the two are quite frequently difficult to separate. In this area plants may have a morphology that is quite typical of one or the other subspecies (e.g. *J.M. Powell* 1975 & *I. Abbott* 47 for subsp. *obovatus* or *P. Foreman* 62 & *K. Baker* 10 for subsp. *revolutus*) or be intermediate between them (e.g. *C.A. Hortin* 6/59.4, *L.J. Pen* LJP 56 & *N. Gibson*

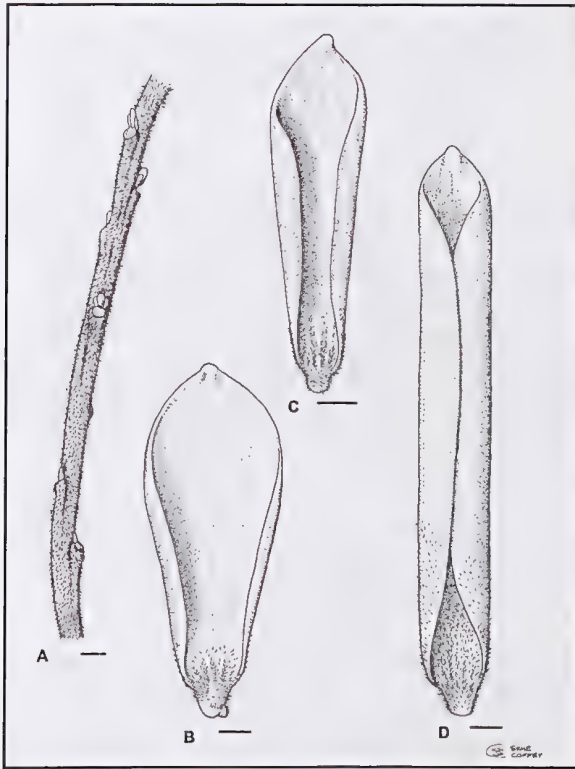


Figure 1. *Leucopogon obovatus* subsp. *obovatus*. A – indumentum on young branchlet; B–D – leaf variation, abaxial surface. Scale bars = 1 mm. Drawn by Skye Coffey from M.N. Lyons & S.D. Lyons 3578 (A), J.M. Powell 1842 (B), E.J. Croxford 5414 (C), E.J. Croxford 5937 (D).

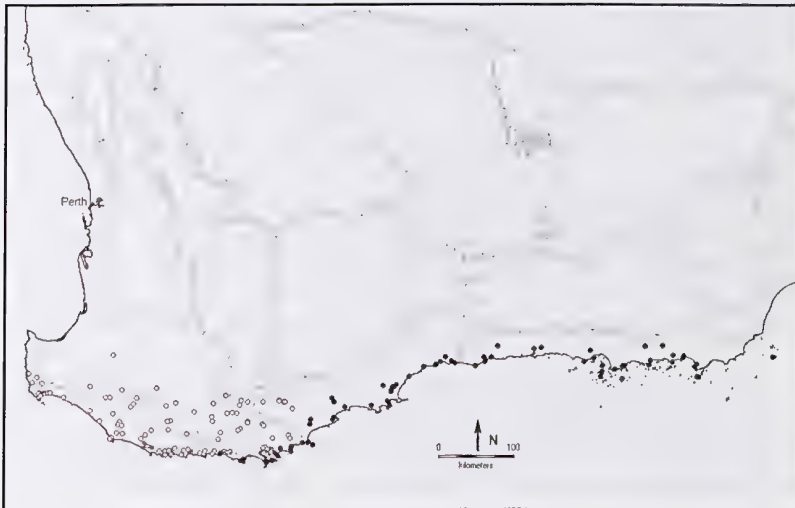


Figure 2. Distribution of *Leucopogon obovatus* subsp. *obovatus* (●) and *L. obovatus* subsp. *revolutus* (○) in southern Western Australia.

& *M. Lyons* 738). These intermediates generally have the leaf shape of subsp. *revolutus*, although always lacking long hairs on the abaxial surface. The branchlet indumentum may be of two kinds: either mostly short but with a few irregularly distributed, longer hairs, or less often monomorphic and then with a hair length longer than normal for subsp. *obovatus*.

**b. *Leucopogon obovatus* (Labill.) R.Br. subsp. *revolutus* (R.Br.) Hislop, *comb. et stat. nov.***

*Leucopogon revolutus* R.Br., *Prodr. Fl. Nov. Holl.* 542 (1810). *Styphelia revoluta* (R.Br.) Spreng., *Syst. Veg.* 1: 657 (1824). *Type*: King George Sound [Western Australia], December 1801–January 1802, *R. Brown s.n.* (*lecto*, here designated: BM 001040176, image seen); Lucky Bay [E of Esperance, Western Australia], January 1802, *R. Brown s.n.* (excluded *syntypes*: K 000348369, K 000348370, images seen) = *L. obovatus* subsp. *obovatus*; Goose Island [Recherche Archipelago, Western Australia], May 1803, *R. Brown s.n.* (excluded *syntypes*: BM 001040177, K 000348374, K 000348377, images seen) = *L. obovatus* subsp. *obovatus*.

[*Styphelia obovata* Labill. var. *angustior* F.Muell., *Fragm.* 6: 31 (1867). *Type*: none cited.]

[*Styphelia obovata* Labill. var. *angustissima* F.Muell., *Fragm.* 6: 31 (1867). *Type*: none cited.]

Young *branchlet* indumentum dimorphic, with a layer of short hairs overtopped by a distinctly longer layer, 0.3–1.0 mm long. *Leaves* in natural posture linear, oblong, narrowly ovate or narrowly triangular, when recurved margins are flattened, narrowly ovate or narrowly elliptic; abaxial surface usually with a mixture of short and obviously longer hairs, or sometimes glabrous. *Style* 0.3–0.5 mm long, either fairly well-differentiated from the ovary apex or tapering  $\pm$  smoothly from the ovary apex to the stigma. (Figure 3)

*Selected specimens examined.* WESTERNAUSTRALIA: parking area at start of track up Mt Chudalup, 200 m from Wheatley Coast Highway [Rd], 16 km SSW of Northcliffe, 9 Oct. 1997, *E.A. Brown* 97/255 & *G. Taaffe* (CHR, NSW, NY, PERTH, UNSW); intersection of Caves Rd and Bussell Highway [N of Augusta], 20 m from road, 11 Oct. 1997, *E.A. Brown* 97/270 & *G. Taaffe* (CANB, NSW, NY, PERTH, UNSW); 20.6 km W of Denmark on Denmark–Walpole Rd, 26 Aug. 1986, *A.R. Chapman* 385 (NSW, NY, PERTH); 1 km W of Hay River on Spencer Rd [SW of Mt Barker], 29 Aug. 1986, *A.R. Chapman* 406 (HO, NSW, PERTH); Lake Seppings, Albany, 30 Sep. 1984, *R.J. Cranfield* 4951 (HO, PERTH); 2 km SSE of Quinninup, 11 Oct. 1999, *R.J. Cranfield* 14040 (CANB, PERTH); carpark at entrance to Treetop Walk, Valley of the Giants, Walpole–Nornalup National Park, 10 Oct. 2003, *D.M. Crayn* 707, *K.A. Kron* & *A.J. Perkins* (NSW, PERTH, WFU); Willyung Hill, about 12 km N of Albany, 23 Sep. 1984, *D.B. Foreman* 825 (AD, MEL, NSW, PERTH); N part of Porongurup National Park, 1.5 km W of the ranger’s residence along scenic drive, 21 Oct. 1991, *W. Greuter* 23062 (PERTH); South Sister Nature Reserve, NE of Albany, along E boundary of southern block, 17 Nov. 2003, *M. Hislop* 3095 (NSW, PERTH); Transect 5, Lake Noobijub. On SE edge of lake, c. 450 m around from inlet drain, c. 25 km NW of Rocky Gully, 31 Oct. 2001, *B. Muir* 95 (PERTH); [Mount] Toolbrunup, Stirling Range National Park, 14 Aug. 1981, *B.F. Palsler* 49 (PERTH); Boat Harbour Rd, c. 4 km SW of South Coast Highway, 25 July 1982, *J.M. Powell* 1961 (K, L, NSW, PERTH); near the Knoll and Nornalup Inlet, Walpole–Nornalup National Park, 14 Aug. 1979, *J.M. Powell* 1163 (BISH, CANB, K, L, NSW, PERTH); Blue Lake Rd, 12.3 km from junction with Denmark–Mount Barker Rd, 24 July 1982, *J.M. Powell* 1955 (CANB, K, L, MEL, NSW, PERTH); Geekabee Hill, W of Cranbrook, 4 Aug. 1986, *J.M. Powell* 2434A (HO, NSW, PERTH); 4 km N of Augusta, at turn-off to Yallingup, 24 Aug. 1986, *J.M.*

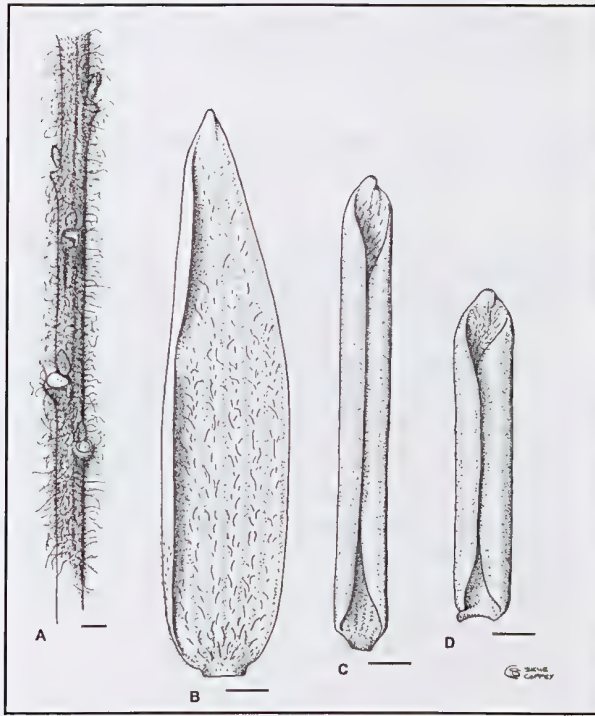


Figure 3. *Leucopogon obovatus* subsp. *revolutus*. A—indumentum on young branchlet; B–D—leaf variation, abaxial surface. Scale bars = 1 mm. Drawn by Skye Coffey from R.J. Cranfield 14040 (A), J.M. Powell 2646 (B), J.M. Powell 1961 (C), W. Greuter 23062 (D).

Powell 2612 (HO, NSW, PERTH); Windy Harbour area, 1–2 km E of Pt D'Entrecasteaux lighthouse, 25 Aug. 1986, J.M. Powell 2646 (NSW, NY, PERTH); Scott National Park, SW corner, 12 Oct. 1990, C.J. Robinson 185 (PERTH); Napier Creek crossing along the Chester Pass Rd [NE of Albany], 1 Sep. 1986, P.S. Short 2598, M. Amerena & B.A. Fuhrer (MEL, NSW, PERTH).

*Distribution and habitat.* Extends from a little south of Margaret River to the Albany area and then north as far as Wheatley [N of Manjimup] and the Stirling Range (Figure 2). This places it mainly in the Warren and Jarrah Forest IBRA bioregions (Department of the Environment, Water, Heritage and the Arts 2008) with a limited occurrence in the far west of the Esperance Plains bioregion. Grows in deep sand, sandy loam or less often loam soils, sometimes over laterite or granite, and as a component of dry or occasionally winter-wet heath, woodland or forest.

*Phenology.* Mostly flowers between late July and the end of October.

*Conservation status.* A widely distributed and common taxon in the wetter parts of the south-western corner of Western Australia

*Affinities.* In addition to the characters used to separate the two in the key above, it is noteworthy that the leaves of subsp. *revolutus* usually have a noticeably longer and narrower aspect than those of the typical subspecies. This subspecies may also be mistaken for *L. capitellatus* DC., another member

of the *L. australis* group (*sensu* Hislop & Chapman 2007). These two are sympatric throughout the range of subsp. *revolutus* but there is no evidence of hybridization or intergradation. The two can be distinguished using the foliar characters in Table 1.

**Table 1.** Morphological differences between *Leucopogon obovatus* subsp. *revolutus* and *L. capitellatus*

	<i>L. obovatus</i> subsp. <i>revolutus</i>	<i>L. capitellatus</i>
<b>Leaf curvature</b>	Adaxial surface usually strongly convex, the margins usually manifestly recurved or revolute, and obscuring at least a portion of the abaxial surface, although in a few leaves the abaxial surface may be visible throughout.	Adaxial surface $\pm$ flat to slightly concave, if the margins somewhat recurved, then the abaxial surface still clearly visible throughout.
<b>Leaf margins</b>	Apparently glabrous or sometimes minutely ciliate under high magnification, with hairs to 0.05 mm long.	Manifestly ciliate with hairs 0.05–0.20 mm long.
<b>Leaf apex</b>	Obtuse or rather abruptly contracted to a blunt point.	Smoothly attenuate.

*Notes.* In his treatment of *Leucopogon obovatus* (as *Styphelia obovata*) in *Fragmenta Phytographiae Australiae*, Mueller (1867) listed two varieties, var. *angustior* F. Muell. and var. *angustissima* F. Muell. Neither of these names were widely adopted. The former does not appear at all in the subsequent literature, and while the latter is included in the online Australian Plant Name Index (APNI: Australian National Botanic Gardens 1991–), the name has apparently never been used in Western Australia. The fact that no types were nominated and that efforts to find potential type specimens have proven fruitless, suggests that it may well never have been the author's intention to formally publish these varieties. However, to judge by Mueller's scant descriptions, and the localities given, it is probable that both are referable to *L. obovatus* subsp. *revolutus*.

*Typification.* Brown based the name *Leucopogon revolutus* on collections he made at King George Sound [Albany], Goose Island and Lucky Bay [both east of Esperance]. The single specimen from the former locality at the Natural History Museum, London is chosen as the lectotype for that name. Although both subspecies occur in the Albany area, Brown's collection from King George Sound clearly has the characteristic, dimorphic indumentum described above for subsp. *revolutus*. Specimens from Goose Island and Lucky Bay are of the same taxon as the type of *Styphelia obovata* collected at Esperance Bay, and are therefore representative of the typical subspecies of *L. obovatus*.

**Leucopogon rubricaulis** R.Br., *Prodr. Fl. Nov. Holl.* 542 (1810). *Styphelia rubricaulis* (R.Br.) Spreng., *Syst. Veg.* 1: 656 (1824). *Type:* King George Sound [Western Australia], December 1801, *R. Brown s.n.* (*lecto*, here designated: BM 000907505!).

*Leucopogon villosus* R.Br., *Prodr. Fl. Nov. Holl.* 542 (1810). *Styphelia villosa* (R.Br.) Spreng., *Syst. Veg.* 1: 657 (1824). *Type:* King George Sound [Western Australia], December 1801, *R. Brown s.n.* (*lecto*, here designated: BM 000907504!).



*Leucopogon angustatus* Benth., in S.F.L.Endlicher, E.Fenzl, G.Bentham, & H.W.Schott, *Enum. Pl.*: 77 (1837). *Type*: King George Sound [Western Australia, 1–11 January 1834], *C.A.A.F. von Hügel s.n.* (iso: MEL 78331!).

*Leucopogon angustatus* Benth. var. *hirsutus* Sond., in J.G.C.Lehmann, *Pl. Preiss.* 1: 311 (1845). *Type*: In regionibus interioribus Australiae meridionali-occidentalis, *L. Preiss* 394 (*syn*: LD 1000221, image seen).

*Leucopogon* sp. Denmark (J.M. Powell 1167), in G.Paczkowska & A.R.Chapman, *West. Austral. Fl.*: *Descr. Cat.*: 240 (2000); in J.Wheeler, N.Marchant, & M.Lewington, *Fl. South West* 2: 603 (2002).

Erect, open *shrubs* to 1.5 m high and 1.5 m wide, single-stemmed at ground level with a fire-sensitive rootstock. Young *branchlets* usually glabrous or with a sparse to moderately dense (rarely dense),  $\pm$  monomorphic indumentum of patent, straight or decurved hairs, 0.02–0.40 mm long. *Leaves* spirally arranged, variously orientated, from steeply antrorse to steeply retrorse, narrowly ovate to narrowly elliptic (where leaf margins are slightly recurved only) or oblong to linear (where strongly recurved or revolute), 4.5–18.0 mm long, 0.7–2.8 mm wide; apex acute, subacute or obtuse with a  $\pm$  recurved callus point; base attenuate or cuneate; petiole broad, rather poorly defined, cream-coloured to pale brown, to *c.* 0.5 mm long, usually glabrous on abaxial surface and hairy on adaxial surface and margins, occasionally hairy throughout; lamina 0.15–0.25 mm thick, curvature variable, adaxial surface convex with the margins varying from slightly recurved with the abaxial surface visible throughout to revolute and the abaxial surface completely concealed, longitudinal axis usually  $\pm$  straight, sometimes distinctly recurved; surfaces discolorous; adaxial surface shiny, usually glabrous to moderately hairy (rarely densely so), the venation usually indistinct but sometimes 3–5 sunken veins evident; abaxial surface paler, usually glabrous, but occasionally sparsely hairy, with 5–7 pale, flat or slightly sunken primary veins, the midrib often raised and rather thicker towards the apex; margins glabrous or irregularly ciliolate with coarse hairs to *c.* 0.3 mm long. *Inflorescences* erect, terminal and upper-axillary, often aggregated into dense conflorescences; axis 4–10 mm long with 4–13 flowers, terminating in a bud-like rudiment or an attenuate point; axis indumentum of moderately dense or dense patent hairs, 0.02–0.08 mm long; flowers erect and sessile. *Fertile bracts* ovate, 1.4–2.0 mm long, 0.9–1.3 mm wide, acute to obtuse. *Bracteoles* ovate, 1.4–2.4 mm long, 0.8–1.2 mm wide, obtuse, subacute or acute, sharply keeled; abaxial surface glabrous or with a sparse to moderately dense indumentum of short hairs, often with a few longer hairs about the keel, becoming scarious towards the margins; adaxial surface shortly hairy in the upper half or throughout; margins ciliolate. *Sepals* ovate or narrowly ovate, 2.0–2.8 mm long, 1.0–1.4 mm wide, obtuse or occasionally subacute; abaxial surface glabrous or with a variable, very short indumentum, the central portion pale greyish green, usually tinged reddish purple towards the apex and in a submarginal band, becoming scarious towards the margins, the venation usually obscure, although sometimes the midrib and the two nearest lateral veins  $\pm$  conspicuous towards the apex; adaxial surface shortly hairy towards the apex; margins ciliate with hairs to 0.2 mm long. *Corolla tube* white, campanulate, shorter than the sepals, 1.1–1.7 mm long, 1.0–1.4 mm wide, glabrous externally and internally. *Corolla lobes* white or pink, much longer than the tube (ratio = 1.6–2.4:1), widely spreading from the base and recurved, 2.3–3.3 mm long, 0.5–0.9 mm wide at base, glabrous externally, densely bearded internally; indumentum white, 0.8–1.2 mm long near apex; glabrous tip 0.15–0.25 mm long. *Anthers* partially exerted from the tube (by 3/4–7/8 of their length), 1.3–2.0 mm long, recurved often strongly towards the apex; sterile tips white, conspicuous, 0.3–0.7 mm long. *Filaments* terete, 0.5–0.8 mm long, attached 1/2–2/3 above anther base, adnate to tube just below sinus. *Ovary* broadly obovoid or  $\pm$  globose, 0.4–0.6 mm long, 0.4–0.6 mm wide, usually with short hairs in the upper half, occasionally glabrous, 4–5-locular. *Style* 0.5–0.8 mm long, well-differentiated from ovary apex, included within the corolla tube; *stigma* not

or scarcely expanded; *nectary* annular 0.20–0.35 mm long, entire or very shallowly lobed, glabrous. *Fruit* oblongoid to narrowly ellipsoid, 3.0–3.9 mm long, 1.3–1.8 mm wide, much longer than the calyx, truncate with a broad, obscurely lobed rim, the surface between the rim and the style base descending steeply, usually shortly hairy about the apex, the hairs sometimes only on the descending surface and therefore difficult to see, occasionally glabrous, the surface grooved longitudinally, but otherwise smooth; style persistent. (Figure 4A)

*Selected specimens examined.* WESTERN AUSTRALIA: 1.3 km N along Nutcracker Rd from junction of Ficifolia Rd, NW of Peaceful Bay, 22 Oct. 2007, *R. Davis s.n.* (NSW, PERTH); Denmark Shire; Denbarker State Forest, ‘the sand track’, 3.1 km W from Denmark–Mount Barker Rd towards Stan Rd, 3 Sep. 1994, *B.G. Hammersley* 1125 (CANB, PERTH); access track to Granite Hill Nature Reserve, 1.4 km E of Moorilup Rd at junction of minor track, E of Porongurup, 16 Nov. 2003, *M. Hislop* 3089 (NSW, PERTH); Mount Barker–Denmark Rd, 2.3 km S of Spencer Rd, 1 Sep. 2005, *M. Hislop* 3502 (CANB, PERTH); Survey Downs Rd, c. 1 km N of Mt Barker–Porongurup Rd, locality of Porongurup, 3 Sep. 2005, *M. Hislop* 3510 (CANB, PERTH); Gull Rock Rd, 4 km N of Gull Rock, E of Albany, 15 Aug. 1986, *G.J. Keighery* 8316 (PERTH); Millbrook Nature Reserve, 25 km NNW of Albany, 8 Sep. 1987, *G.J. Keighery & J.J. Alford* 1644 (PERTH); Woolbale Hills, D’Entrecasteaux National Park, 6 Oct. 1997, *E.D. Middleton* EDM 63 (PERTH); 750 m N of the coast in Nuyts Wilderness, 2 km E of Poison Hill, 6 Oct. 1997, *E.D. Middleton* EDM 73 (PERTH); on edge of Cephalotus swamp, C. Milton’s property, 3 km S of Mount Barker, 28 Mar. 1975, *K.F. Kenneally* 4580 (PERTH); near the Knoll and Nornalup Inlet, Walpole-Nornalup National Park, 14 Aug. 1979, *J.M. Powell* 1170 (CANB, CBG, K, L, NSW, PERTH); 8 km SW of Denbarker Rd turnoff on Denmark–Mt Barker Rd, 18 Aug. 1979, *J.M. Powell* 1206 (CANB, K, L, MEL, NSW, PERTH); Hunwick South Rd junction with Lower Denmark–Albany Rd, 21 Aug. 1979, *J.M. Powell* 1264 (CANB, HO, K, L, NSW, PERTH); Granite rocks above Cheyne Beach, 22 Aug. 1979, *J.M. Powell* 1291 (AK, CANB, K, L, NSW, PERTH); Boat Harbour Rd, c. 4 km SW of South Coast Highway [W of Denmark], 25 July 1982, *J.M. Powell* 1960 (AK, BISH, CANB, HO, K, L, MEL, NSW, PERTH, RSA); 1.2 km N from coastal end of Ledge Point [Beach] Rd [E of Albany], 29 Aug. 1986, *J.M. Powell* 2684 (NSW, PERTH); Lower Kalgan River, 15 Aug. 1951, *R.D. Royce* 3726 (PERTH); Narrikup, 29 July 1953, *R.D. Royce* 4240 (PERTH); by King River, c. 1 km SW of King River settlement (N of Albany), 23 Sep. 1982, *A. Strid* 20436 (PERTH); Plot 5454 Boulder Hill [near Two Peoples Bay], 6 Oct. 1992, *G. Wardell-Johnson & A.R. Annels* ARA 2527 (PERTH).

*Distribution and habitat.* *Leucopogon rubricaulis* is restricted to near south coast localities between Broke Inlet [W of Walpole] and Cheyne Beach [c. 60 km E of Albany] and as far north as the Mount Barker area (Figure 5). This places it within the Warren and Jarrah Forest IBRA bioregions (Department of the Environment, Water, Heritage and the Arts 2008). It grows in a variety of vegetation types in both dry and winter-wet habitats in either deep sand or shallow sandy soils over granite or occasionally laterite.

*Conservation status.* Although a regional endemic, this is a locally common species which is known to occur in a number of National Parks and Nature Reserves. No conservation coding is recommended here.

*Affinities.* Despite their superficially similar appearance, the morphological differences between *Leucopogon rubricaulis* and *L. obovatus* are significant. The fruiting character of the former clearly places it in Group C *sensu* Hislop & Chapman (2007) and is qualitatively different from that of *L. obovatus* which was assigned to Group A. In common with the other members of Group C, the drupes of *L. rubricaulis* are oblongoid or narrowly ellipsoid, longitudinally grooved with a truncate apex and

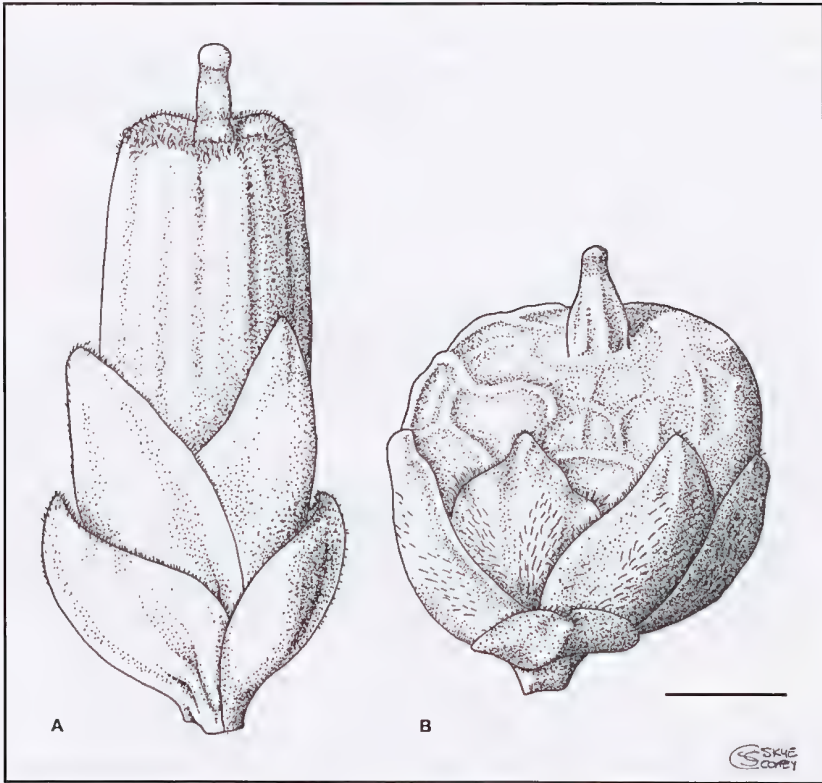


Figure 4. *Leucopogon rubricaulis*. A – fruit. *Leucopogon obovatus* subsp. *obovatus*. B – fruit. Scale bar = 1 mm. Drawn by Skye Coffey from M. Hislop 3089 (A), W. Greuter 22878 (B).



Figure 5. Distribution of *Leucopogon rubricaulis* in south-west Western Australia.

no mesocarp evident (Figure 4A). In contrast those of *L. obovatus* are globose or depressed-globose, with smoothly rounded shoulders and an obvious mesocarp manifesting as a prominent reticulum on dried specimens (Figure 4B). The two species can also be separated by a different foliar indumentum. Whereas in *L. obovatus* the upper leaf surface has characteristically short, antrorse, tubercle-based hairs (sometimes abraded on older leaves, the surface remaining verrucose), in *L. rubricaulis* it is always smooth and often glabrous. If an indumentum is present, although it may be quite variable, it is never of the kind described above for *L. obovatus*.

The combination of recurved to revolute leaf margins and a usually hairy ovary makes *L. rubricaulis* relatively easy to distinguish from the other members of Group C that occur on the south coast. It could possibly be mistaken for *L. assimilis* R.Br., in that the two species share relatively long, narrow leaves and co-occur in near-coastal habitats around Albany. There is however an obvious difference in the leaf curvature between the two, the leaves of *L. assimilis* being adaxially concave and with the abaxial surface prominently ribbed.

*Notes.* That *Leucopogon rubricaulis* should have been placed in synonymy under *L. obovatus* (as *L. revolutus*) by Bentham (1868) seems particularly surprising given that fruit of the two species was apparently available to him. The type material of *L. rubricaulis* collected by Brown is fruiting and shows the characteristically elongate and truncate drupe of that species. In Bentham's (1868) description of *L. revolutus* however, the fruit shape is given as 'nearly globular' which although apt for *L. revolutus* is difficult to reconcile with the type of *L. rubricaulis*.

In his description of *L. villosus*, Brown (1810) made mention of a close similarity with *L. rubricaulis*, the two apparently differing only in regard to indumentum. Although the long hairs seen on the vegetative parts of the type of the former are unusual (there are no specimens at PERTH that are closely comparable) there are good reasons to believe that the two should be regarded as conspecific. While a majority of collections of *L. rubricaulis*, including the type, have branchlets and leaves that are either glabrous or very shortly hairy there are a number of specimens with a moderately dense indumentum on these parts. Particularly noteworthy in this regard are three collections made by J.M. Powell at the same site in the Torbay area, west of Albany. Two of these (JMP 1264 and 1265) have glabrous leaves and minutely hairy branchlets, while the third (JMP 1266) has a conspicuous indumentum of quite long hairs covering its vegetative parts. Although perhaps not as extreme as the contrast between the types of *L. rubricaulis* and *L. villosus*, this kind of dimorphism also occurs elsewhere in Group C, notably in *L. pulchellus* Sond. and *L. polymorphus* Sond. Aside from the indumentum, there are no other foliar characters to separate *L. villosus*. In addition, and crucially, although the lectotype of *L. villosus* has very little fertile material present, the remains of an old flower showed the ovary apex to be minutely hairy. This relatively uncommon feature is present in all but a very few collections of *L. rubricaulis*. Examination of a scanned image of type material of *L. angustatus* var. *hirsutus* Sond., suggests that this should also be regarded as a (moderately) hairy variant of *L. rubricaulis*.

Although no type specimens of *L. angustatus* could be located at W, K, or BM, the MEL isotype is typical of *L. rubricaulis* in all respects. Another Hügel collection (MEL 78316) from King George Sound has the characteristic indumentum of *L. obovatus* subsp. *revolutus*. This specimen, from Sonder's herbarium, is annotated in his writing '*Leucopogon villosus* Benth! in Hügel Enumeratio'. This suggests that it is part of the collection that Bentham assigned to *L. villosus* (i.e. no. 266, in Bentham 1837) and provides further indication of Bentham's changing concepts within this group of species.

### Lectotypification of *Leucopogon capitellatus* var. *sparsiflorus*

***Leucopogon capitellatus*** DC., *Prodr.* 7(2): 747 (1839). *Type*: ‘in Novâ-Hollandiâ ad Swan-river’, [Western Australia 1835–1838], *J. Drummonds.n.* (*holo*: G-DC, image seen; *iso*: K 000348344 scanned image seen).

*Leucopogon capitellatus* DC. var. *sparsiflorus* Sond. [published as  $\beta$  *sparsiflorus*] in J.G.C. Lehmann, *Pl. Preiss.* 1: 312 (1845). *Type*: In glareosis inter frutes montis prope fontem St. Ronan’s well [W of York, Western Australia], 25 April 1840, *L. Preiss* 427 (*lecto*, here designated: MEL 2102508!).

*Notes.* Although common and with a wide distribution throughout the wetter parts of the south-west of Western Australia (from Perth to the Albany area), *Leucopogon capitellatus* is a fairly uniform species with relatively minor variation in leaf size and curvature, indumentum and sepal shape. Because it was collected in April the type of *L. capitellatus* var. *sparsiflorus* has only a few dead flowers present. Just the same, the material is good enough to allow an unequivocal determination that it is typical for *L. capitellatus*. It seems probable that Sonder was misled by the poor quality of the collection, and the limited number of specimens of *L. capitellatus* that were available to him. The inflorescence characters that he used to separate his new variety (i.e. a fewer-flowered, axillary-only inflorescence which was neither spike-like nor capitate) certainly do not hold up in the light of the variation that is observable across the species.

The specimen lectotypified here is from Sonder’s personal collection.

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